

Answers to AP Chem summer assignment: August 2014

Disclaimer: I did NOT use any answer key from book or anywhere else. I "suffered" through these on a foggy day in August.

Note: I hate to say this, but if math (particularly algebraic conversions, log and ln) are not your strength, you might want to think twice about AP Chem. Just telling you the truth.

Chapter 1: (Let's face it, everything up to # 46 should be no-brainer stuff)

9. a. rice pudding is Heterog; b. Seawater is (usually) Homog (exceptions?) c. Magnesium is a pure substance (an element); d. gasoline is a homogeneous mixture made up of various organic alkanes and other additives.

10. a. air is a homog mix; b. tomato juice is usually a homog mix; c. iodine is a pure substance; d. sand is a hetero mix

11. a. S; b. K; c. Cl; d. Cu; e. Si; f. N; g. Ca; h. He

12. a. C; b. Na; c. F; d. Fe; e. P; f. Ar; g. Ni; h. Ag

13. a. lithium; b. aluminum; c. lead; d. sulfur; e. bromine; f. tin; g. chromium; h. zinc

14. a. cobalt; b. iodine; c. krypton; d. mercury; e. astatine; f. titanium; g. potassium; h. germanium

17. Phys: color, luster, MP, BP, Dens, pounded into thin sheets, drawn into wires, conductivity
Chem: burns in air; reacts with Cl;

18. Phys: color, MP, hardness, Density,
Chem: rxn with acid (does it really dissolve??); rxn with oxygen

19. Phys: b. c.
Chem: a. d. e.

27. a. $D = m/v = 39.73\text{g}/25.0\text{ ml} = 1.5892 = 1.59\text{ g/mL}$ No, it will not float in water.
b. Since $D=m/v$, $m= DV$; $m = 21.45\text{ g/ml} \times 75.00\text{ ml} = 1608.75 = 1609\text{ g}$
c. $m = DV$; $V = m/d = 87.50\text{ g}/0.8787\text{ g/ml} = 99.5788.... = 97.58\text{ mL}$

28. a. $V = l w h = 1.500\text{ cubed} = 3.375\text{ mL}$ $D = 76.31\text{ g}/3.375\text{ mL} = 22.6103.... = 22.61\text{ g/mL}$
b. $m = DV$ $m = 4.51\text{ g/ml} \times 65.8\text{ ml} = 296.758 = 297\text{ g}$

c. note $V = 0.1500\text{L}$ which equals 150 mL . $m = DV$ $m = 0.8787\text{ g/mL}$
 $X 150\text{ mL} = 131.805 = 131.8\text{ G}$ (note: I would use 3 sig figs here since 0.1500L in original data has 4 sig figs).

37. a. 3 sig figs; b. 2 sig figs; c. 5 sig figs; d. 3 sig. figs. e. 5 sig figs.

38. a. 5 sig figs; b. 3 sig figs; c. 4 sig. figs; d. 6 sig. figs.

*46. Conversions: Wicked important skill for chem and physics!!!!

a. $2.998 \times 10^8\text{ m/s}$ convert to km/hr . This is a "complex conversion" that involves two independent variables of distance and time. Answer is: $1.072 \times 10^{-7}\text{ km/hr}$

b. 436 m

c. $3.665 \times 10^9\text{ Liters}$ (I think!!)

d. 12.064 grams cholest/ml blood (I think!!!)

*47. more conversions!!!!

a. 432 000 sec

b. (if you run track, that would help, here!) 88.50 miles

c. $\$0.47/\text{L}$ (looks good in Canada!) What's the real price in dollars/L if gas is $\$3.60/\text{gal}$.

d. 46.4 Km/hr (tough one!)

e. 0.0250 L/sec

f. 675 cm cubed (I think!)

*50. More math problems. I love it!!!!

a. train will technically need 10.6 charges, but you might as well give it 11 full charges.

b. loon will fly at 31 miles/hr . that's pretty fast.

c. hmmm. I'm getting 0.00481 L for piston displacement. Not so confident on that one!!!

d. Try 40 million plus liters of oil spilled by the Valdez.

Problems from Chapter 2:

1. a. due to attraction betw neg electron and + plate

b. charge must be neg

c. I would expect bending to stay the same (but may need to check **Coulomb's Law**)

d. Hmmm.... I really think I need to do some reading, but I'm guessing the bend will decrease (????)

2. Easy!! Metals: red, green; nonmetals blue and yellow. Red is alk earth metal. Yellow is a noble gas.

3. Drawing represents an ion of Sulfide S^{2-}

4. drawing i is ionic (closely packed with regular crystalline structure), ii would be molecular due to more random, chaotic motion and smaller representative particles.

5. IF₅, Iodine pentafluoride

11. JJ Thomson noted that the electron beam appeared to be moving from - to + charged ends of tube and the beam was being attracted to + magnet and away from - magnet.

17. a. protons, neutrons, electrons b. P and N is 1 amu, e is 1/1840 amu c. Most massive is the Proton (by 1/1840 of an amu over the N). Least massive is the electron.

18. a. False. It does have most of the mass, but it's volume is incredibly small
b. true.
c. false for most elements. the number of neutrons can vary with the given isotope.
d. True.

19. Atomic number is the positive nuclear charge and is the number of protons in the nucleus. The mass number is the sum of protons and neutrons for any given isotopes. The mass number can vary for the various isotopes for a given element.

20. a. X with atomic number of 16 (first and third). b. Sulfur.

25. I can't type in symbols, but a. Pt with Z 94 and A 212 b. Kr with Z 36 and A 84
c. As with Z 33 and A 75 d. Mg with Z 12 and A 25.

27. a. AMU is based on 1/12 of mass of Carbon-12 isotope. b. atomic masses are based on weighted average of all known naturally occurring isotopes.

35. a. Cr metal; b. He nonmetal; c. P nonmetal; d. Zn metal; e. Mg metal f. Br nonmetal; g. Ar metalloid

39. The simplest whole number ratio for the element. The molecular formula is the "real" formula (and could be the same as the empirical formula). The structural formula identifies the order of elements and bond types.

41. a. AlBr₃ b. C₄H₅ c. C₂H₄O d. P₂O₅ e. C₃H₂Cl f. BHN₂

42. a. Molec C₆H₆, Emp CH; b. SiH₄ is both emp and molec; c. B₂H₆ is molec, Emp BH₃
d. molec C₆H₁₂O₆, Emp CH₂O

49. a. Mg⁺² b. Al⁺³ c. K⁺¹ d. S⁻² e. F⁻¹

52. a. AgI b. Ag₂S c. AgF

53. a. CaBr₂ b. K₂CO₃ c. Al(C₂H₃O₂)₃ d. (NH₄)₂SO₄ e. Mg₃(PO₄)₂

54. a. Cu₂S b. Fe₂O₃ c. Hg₂CO₃ d. Ca₃(AsO₄)₂ e. (NH₄)₂CO₃

56. a. Molec b. Ionic c. Molec d. Ionic e. ionic f. Ionicg.
ioninc h. molec

59. a. magnesium oxide b. aluminum chloride c. lithium phosphate d. barium perchlorate
e. copper(II) nitrate f. iron(II) hydroxide g. calcium acetate h. chromium(III) carbonate
i. potassium chromate j. ammonium sulfate

61. a. Al(OH)₃ b. K₂SO₄ c. Cu₂O d. Zn(NO₃)₂ e. HgBr₂ f. Fe₂(CO₃)₃
g. NaBrO

62. a. Na₃PO₄ b. Co(NO₃)₂ c. Ba(BrO₃)₂ d. Cu(ClO)₂ e. Mg(HCO₃)₂ f.
Cr(C₂H₃O₂)₃ g. K₂Cr₂O₇

64. a. HBr b. H₂S c. HNO₂ d. carbonic acid e. chloric acid f.
acetic acid

65. a. sulfur hexafluoride b. iodine pentafluoride c. xenon trioxide d. N₂O₄
e. HCN f. P₄S₆

69. a. a hydrocarbon is a molecular compound containing C-H bonds
b. butane C₄H₁₀. Emp Formula is C₂H₅

70. a. "ane" b. C₆H₁₄ Emp formula is C₃H₇

71. a. functional groups are very specific groups of atoms attached to organic compounds.
b. the functional group for alcohols is -OH c. C₄H₅OH

72. a. both ethane and ethanol have 2 carbons in their chain. b. 1-Propanol has -OH hydroxyl group attached to an end carbon in place of a hydrogen.

Chapter 3 Problems (Sections 3-1 through 3-4 only)

11. a. 2, 1, 2 b. 1, 1, 2 c. 1,2, 1, 4 d. 1, 12, 4, 3 e. 2, 13, 10, 10
f. 2, 3, 1, 6 g. 1,4, 3, 1

17. a. $\text{Mg} + \text{Cl}_2 \rightarrow \text{MgCl}_2$
 b. $\text{BaCO}_3 \rightarrow \text{BaO} + \text{CO}_2$
 c. $\text{C}_8\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ (balances with 1, 10, 8, 4)
 d. $\text{CH}_3\text{OCH}_3 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ (balances with 1,3,2,3)
27. a. Avogadro's Number is 6.02×10^{23} . It is the number of particles in one mole of those particles.
 b. formula wt is the wt in amu. Molar is is the gram equiv of formula wt.
28. a. One mole of C-12 has a mass of 12 grams
 b. There are Avogadros Number of atoms in that one mole of carbon-12
31. 4.4×10^{24} Kg in one mole of shotputs. A bit less than the mass of the earth.
32. One mole of pennies divided up among 292 million folks gives each approx 2×10^{11} dollars. The national debt is 7×10^{12} dollars. Pretty close.
33. a. 17 grams CaH_2 b. 0.0361 Mole magnesium nitrate c. 1.84×10^{22} molecules methyl alcohol
 d. 1.41×10^{24} atoms of carbon

The END!!!! NOTE: I have NOT checked any of these answers against any answer key. We will critique and correct as necessary during the first couple of days before your first exam which is scheduled for Wed, Sept 3.